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FINANCE

MASTER'S FINAL WORK

DISSERTATION

SOCIO-DEMOGRAPHIC FACTORS AND RISK-TAKING

PATRÍCIA ISABEL HENRIQUES OLIVEIRA

OCTOBER - 2017

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Abstract

In the financial literature, there are several studies with the goal to understand better how to assess individual differences in attitude towards risk. These differences among individuals rely on the way they behave in risky situations, in which the implementation of an action carries a risk. Nowadays it is important to understand which factors influence an individual's risk behavior, which socio-demographic features lead to different profiles. However, authors have different opinions on this matter and there are several scales that measure risk in different ways, consequently achieving different conclusions. Using a sample of ISEG students of different degrees and programs, data was collected based on a questionnaire distributed online. To assess the relationship between the different socio-demographic variables, risk attitudes were measured using two well-established existing scales which evaluate in different situations an individual's risk attitudes and behaviors. The results show that some socio-demographic variables have influence in the risk profile of the investors (*e.g.* gender), while other do not seem to have impact. These findings might be important in the future for companies to better understand their investors' needs.

KEY WORDS

Risk-taking, Risk attitudes, Risk tolerance, Education, Demographic variables, Profile

Acknowledgements

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Abbreviations

EU – Expected Utility Theory

PT – Prospect Theory

BDT – Behavioral Decision Theory

GL-RTS – Grable and Lytton Risk Tolerance Scale

RRF – Risk-Return Framework

DOSPERT – Domain Specific Risk Attitude Scale

1. Introduction

Investors are participants in the financial markets, who allocate resources in different types of securities. Investors may have different investment strategies, which exhibit a variety of behaviors when investing – these are a reflection of their different attitudes towards risk.

The definition of risk can be interpreted differently whether one considers "Standard" Finance theory, with rationality of all agents, or Behavioral Finance theory. A more traditional, "Standard" Finance theory involves the objective/quantative measurement of risk of an investment (such as the standard deviation, variance, or Beta) – according to Ricciardi (2008) the basis of this approach is the macro-level (cumulative) assessment of risk encompassing all the investors within the markets. On the other hand, Behavioral Finance theories study the subjective/qualitative aspects of risk – the role of cognitive factors and emotional issues on risk taking (Tversky & Kahneman, 1979).

Taking the previous debate into account, the idea for this dissertation came from the various measurements (subjective and objective) of risk, and the personal interest of the author to investigate which are the factors that most influence an individual's risk-taking behavior.

The dissertation uses a sample of University students from a School of Economics and Management. For this purpose, a questionnaire was constructed and applied to a sample of more than two hundred students, from both undergraduate degree and post-graduate programs.

In building this questionnaire we take into account two important dimensions: (i) On the one hand, we collect data from each participant in terms

of his/her own socio-demographic details (such as gender, age, family status, income level, and academic and professional background, among others); and (ii) on the other hand, we apply two risk measurement scales that are well established in the literature (the Domain-Specific Risk-Attitude Scale, DOSPERT Scale, by Weber, Blais & Betz (2002), and the Grable & Lytton (1999) Risk Tolerance Scale, GL-RTS Scale).

Hence, with our questionnaires we are able to intersect the risk behavior attitudes that are measured by the DOSPERT and GL-RTS Scales with the socio-demographic variables of our student population and investigate their impact on the potential investors' risk profiles.

We find that variables such as gender, age, financial knowledge perception, level of financial education, parental education, marital status, level of income and parenthood influence the risk profile of the individuals, while other socio-demographic variables seem not to have impact on risk. More precisely, in our sample gender is the variable that has the most significant impact on attitudes towards risk, with women being more risk averse.

The dissertation is organized as follows. In section 2 we present a short literature review on risk attitudes to frame the overall objective of the dissertation, and also present the hypothesis that will be empirically tested. In section 3 we present our methodological approach, including an explanation of how our questionnaire is built and implemented, together with variables definition and descriptive statistics of our sample. In this section, we also provide information about the rationale and relevance of the two widely used risk measurement scales that we include in our empirical study. Our main empirical results are

presented and discussed in section 4. Finally, the conclusions, some limitations of our study, and possible related future topics for research are presented in section 5.

2. Literature Review and Hypotheses

In this section, we start by making a short introduction to the two main economic theories underlying choices in the context of uncertainty (Expected Utility Theory and Prospect Theory), and then explore the different socio-demographic factors that have been shown to influence risk-taking attitudes.

2.1 Risk

According to Slovic (1987), risk is a concept created by humans to help them in understanding and dealing with the dangers and uncertainties of life. Risk is dependent on our minds and cultures, and the consequent risk assessments are subjective. MacCrimmon & Wehrung (1990), have mentioned that risk attitude is when a person stands in the continuum from risk aversion to risk seeking, and this phenomenon should be treated as a personality trait. In addition to this, the more risk-taking behavior a person reveals, the more success personally and in corporate terms will become.

Arrow (1965) and Pratt (1964) have studied the concept of absolute risk aversion, which is a measure of the Utility function's curvature. Looking at the equation below, U'' and U' represent the first and second derivative of the Utility function, respectively.

$$Ra = -\frac{U''}{U'} \qquad (1)$$

Further on, it will be discussed in more detail the main theories (the Expected Utility Theory – E.U. – and Prospectus Theory – P.T.) which evaluate risk attitudes, and their assumptions, as well as the different concepts of risk attitude in general and the Overconfidence phenomenon.

In the field of Finance, Markowitz was one of the first researchers to introduce the concept of Expected Utility, in a sequence of influential publications (Markowitz, 1951, 1952). The E.U. Theory essentially states that decision makers will always maximize their expected payoffs in accordance with their wealth utility function, a function which is specific to each investor, may change over time, and is influenced by one's risk attitude. The utility function can be (a) concave, implying that the person is risk averse (prefers a payment with certainty equal to the expected value of a gamble, rather than taking the gamble); (b) convex, revealing a risk-seeking investor profile (someone who accepts a certain payment only if it is sufficiently higher than the expected value of a gamble, rather than taking the gamble itself); (c) or linear, which reveals a risk neutral investor profile (an investor who is indifferent between taking a gamble or receiving a fixed payment equal to the expected value of the gamble).

Prospect Theory introduced by Tversky & Kahneman (1979), became an alternative to the E.U. Theory in terms of describing economic agents' behavior towards risk. Essentially, the process of decision making can be viewed as a choice between gambles or prospects. A prospect is a contract that yields an outcome x_i with probability p_i. In this theory, there are certain principles to follow. The Certainty effect reflects people's tendency to overweight the certain outcomes relatively to merely probable ones. According to MacCrimmon &

Larsson (1986), in scenarios where winning is only possible but not probable, most people choose the prospect which offers a larger gain. The Reflection effect demonstrates the reflection of prospects around zero reverses the preference order. It shows the preferences between positive and negative prospects, and subsequently implies a presence of risk aversion in the positive domain and risk seeking in the negative domain. The Probabilistic Insurance represents many forms of protective action where one part pays a certain amount to reduce the probability of an undesirable event to occur. In addition, Contingent Insurance is capable of eliminating the most risk of loss in a certain stock, however it does not cover other risks. Consequently, when the probabilities of unprotected loss are taken in account, the Contingent Insurance will be more attractive than the Probabilistic Insurance type. Regarding the Isolation effect, from the point of view of Tversky (1979), people often disregard components that the alternatives share and focus on the components that distinguish them, in the simplification process of choices between alternatives. Hence, different decompositions of prospect's pairs (caused by several distinctive components) lead to different preferences and consequently inconsistent preferences. According to Basu, Raj & Tchalian (2008), Prospect Theory should be seen as the manner investors actually do behave rather than the normative theory of how they should behave. Prospect Theory was designed, in part, to account for the fact that most people seem to prefer a risky option over a sure thing when the choices are framed in a positive way (*e.g.*, the number of people who survive a car crash), but they shift their preferences when the same choices are framed in a negative way (*e.g.*, the number who did not survive).

Even though Prospect Theory arises from the Expected Utility theory, there are two main features that distinguish them. The first one is related to the assumption in P.T. that values are attached to changes in wealth rather than merely to final states, and that the decision weights present in P.T. do not coincide with the stated probabilities of E.U. theory Secondly, P.T. often leads to inconsistencies, intransitives, and violations of dominance, which do not take place in the E.U. theory framework.

An important phenomenon that has been described by several authors (*e.g.*, Odean, 1998) and should influence an individual's attitude towards risk is what is known as the Overconfidence phenomenon. The Overconfidence phenomenon can lead an investor to adopt different behaviors, such as Overestimation and Illusion of control, Overplacement, Overprecision, Illusion of knowledge, Overoptimism, Familiarity effect and Home-bias (representing a higher tendency to expose him/herself to familiar stocks or situations). The Overconfidence phenomenon has two facets: the Miscallibration and the Better-than-average effect. Regarding the former, Miscalibration is related to the estimates of quantities that could be potentially discovered (*e.g.*, the length of a river) or that are currently unknown (*e.g.*, a future price stock). Concerning the latter, the Better-than-average effect, Taylor & Brown (1988) mention that people tend to judge themselves to be better than the average person (in terms of skills or positive personality traits), which lead them to possess unrealistically positive perspectives of themselves and their abilities. Overall, the Overconfidence phenomenon has a positive effect on risk taking, according to Odean (1998).

2.2. Gender

It is relevant to understand to what extent an individual's gender affects his or her risk attitudes. In what comes next, several studies which have investigated this relationship are presented.

The hypothesis of "Risk as value" described by Kelling, Zirkes, & Myerowitz (1976) considers situations that explain differences between those people who take risks on a regular basis and others who, in opposition, avoid risks. A conclusion reached by these studies is that high levels of risk across contexts in men can be caused by the social belief of highly valued masculine tendency, giving a higher relevance to the premise that men take more risks, regardless of the context. On the opposite side, there are models which explain the underlying reasons why only certain people take risks in a given situation. The main two conclusions about why people take risks in particular situations are (a) because they believe they will achieve success and (b) they value success in that context (Atkinson (1983); Byrnes (1998); Irwin & Millstein (1991); Wigfield & Eccles (1992)). That being said, these authors suggest that gender differences would vary by context, and that women have higher risk taking in some domains. For instance, when women feel more confident and motivated about a given activity they are more willing to take more risk, proving the context specificity. As a result, this model predicts that men are more risk taking in most observed cultures, given that sensation seeking is found more often in men than women. In the same line of thought, Wilson & Daly (1985) construct a sociobiological model which proposes that, in general, men take more risks than women, even though it was found that gender differences were not observed for all contexts.

Additionally, these authors had defined risk taking as an attribute of the masculine psychology along History. Therefore, when faced with competitive situations and events in which there is a large spread in rewards between winners and losers, it is considered that men take more risks than women.

Furthermore, Byrnes, Miller & Schafer (1999) have found the difficulty to evaluate risk taking in several contexts: they conducted over 150 studies with the purpose of eliciting the risk-taking behaviors of men and women across different domains (*e.g.*, financial or recreational risks) and tasks (*e.g.*, hypothetical choices). Their conclusion was once more that overall men take more risks than women, even though the gender difference fluctuates in function of the various domains. Other authors who have reached a similar conclusion were Barsky, Juster, Kimball & Shapiro (1997), and Johnson (1994), although they have found no evidence of differences in performance across genders. Furthermore, Grable & Joo (1999) found no relationship between gender and financial risk tolerance. In addition, Lopes (1987) concluded that Prospect Theory was not designed to count for such individual differences.

Regarding the concept of Overconfidence, there are also authors who conclude that even though men and woman reveal overconfidence aspects in trading, men are generally more overconfident than women (Lundeberger, Fox & Puncocher, 1994). This observation can be explained by the fact that there exists an increased social pressure on females to exhibit underconfidence in events (as claimed by Pulford & Colman (1997)). In fact, it is implied that individuals who present more personality' traits of overconfidence will hold riskier portfolios, adopting a risk-seeking behavior (Odean, 1998). In addition, one of the reasons

why men are more risk taking than women in because they trade more often than women.

Therefore, following the existing literature, we will try to test the following hypothesis in this dissertation – *H1: Men are more risk seeking than women.*

2.3. Age

It is also relevant to understand how individuals' age affects their risk attitudes. Next, we summarize previous studies that have investigated this relationship.

In terms of age, there are only a few papers studying the effect of this variable in risk-taking attitudes (apart from some studies using Donkers et al (2001)). Dolmen, Falk, Huffman, Sunde, Schupp, & Wagner (2005) have studied the effect of age on risk preferences, and in a variety of contexts. In this way, the observed differences in risk among various ages can be explained by major historical events, implying a financial conservatism in ageing societies. In addition, the risk-taking behavior of an individual can vary over his or her lifecycle, even though risk preferences are relatively stable across situations. For instance, risky behavior in certain activities such as driving, sports, and health, could be overlooked at an early age but avoided upon later in life. On the other hand, this mechanism could be biological or evolutionary (Dolmen *et al.*, 2005).

Again according to Dolmen *et al.* (2005), aging can lead to both emotional and motivational positive changes, which can create biases in information processing, and hence affect risk choices. For example, younger adults tend to show higher receptiveness to losses, when compared to older individuals. Despite the previous fact, younger individuals tend to seek for gains, while older

adults are more likely to prevent losses. That is, age-related differences in risk taking were perceived to be a function of decreased learning performance.

Likewise, Grable & Lytton (1998), Morin & Suarez (1983), and Yao (2004 and 2005) have showed that risk tolerance decreases with age. More specifically, Grable & Lytton (1998) used age as a continuous variable and found that self-perceived risk tolerance is negatively related to age. Morin & Suarez (1983) used the 1970 Canadian Survey of Consumer Finances dataset with the purpose to understand the household demand for risky assets, in which the age was included in categories from 35 years to over 65 years old. Their main inference was that risk tolerance decreased uniformly with age.

Conversely, authors such as Bertaut (1998), Grable (2000), Guiso (1996), Hui Hanna (1997), and Zhong Xiao (1995) claim that age was positively related to risk tolerance. There are also some researchers (Ameriks & Zeldes (2004), Bertaut & Starr-McCluer (2000), Chambers & Schlagenhauf (2002), and Riley & Chow (1992)) who state that there is no linear pattern in risk tolerance, since it has a peak which occurs around 55 years old (from this age, individuals are less likely to invest).

In agreement with the previous literature, and taking into account the age group of the population of students in our study, the hypothesis related to age being studied in this dissertation will be – *H2: Age decreases risk taking behavior.*

2.4. Parental education

Parental education has also been shown to influence the risk-taking behavior of individuals, and there are some theories supporting this evidence.

According to Mata, Josef, Samanez-Larkin, & Hertwig (2012), there is a positive correlation between parental education and willingness to take risks. In addition, it was found that the risk magnitude versus parental education differs across contexts, being less consistent. The main results of Mata *et al.* (2012) regarding this variable were (a) there is a strong correlation between the father's education (and occupation) and children's future employment choice, (b) the father's education reveals a large and significant positive effect on disposition to invest, while the mother's education has no explanatory power for investment choices, and (c) individuals who have parents with higher education present a more risk-seeking behavior.

Thus, the hypothesis related to Parental education, according to the main arguments previously mentioned, will be – *H3: Individuals whose parents hold a higher education degree are more risk taking.*

2.5. Family structure

2.5.1. Marital status

In this hypothesis, we will address the effect of the individual's marital status in his/her risk-taking attitude, framing the analysis in the existing related literature.

As stated by Lupton & Smith (2003) married individuals have higher savings rates, and consequently are more likely to invest in the stock market with those savings (Xiao, 1996; Guiso et al., 2003; Badunenko et al., 2009; Bertocchi et al., 2011; Christiansen et al., 2015), and hold portfolios with higher risk levels (Love, 2010; Christiansen et al., 2015). The same authors also find that the risk

aversion levels of both partners are considered, and as a result the partners demonstrate altruism towards each other, a situation known as the joint maximization problem. Therefore, they concluded that married individuals were more likely to be more risk seeking than single people, giving that they will share the level of risk among them, according to Love (2010) and Christiansen *et al.* (2015).

On the other hand, several authors have concluded the opposite: married individuals are less willing to take risks (Halek & Eisenhauer (2001), Yao et al. (2004), Sahm (2007), and Dohmen et al. (2011)). In fact, married individuals follow a set of norms from the institution of marriage, which include roles and tasks such as ownership of resources, consensus in decision-making, support, and maintenance (Klein & White, 1991 and 1996). It was found that spouses may find it relevant to conserve their savings with the purpose to fulfill roles and accomplish goals, for instance to support their children's future costs. As a result, the potential losses from risky investments will appear to be higher than the potential gains, and hence it will be more advantageous for married individuals to avoid risks preferring a certain outcome rather than a probable outcome (Tversky & Kahneman, 1979). Whereas single individuals do not have so many present or future responsibilities, having fewer roles to perform according to social norms and consequently higher potential gain than solely personal losses. Therefore, single people are perceived to carry higher levels of risk tolerance.

As evident from the previous paragraphs, there is no consensus in the existing literature regarding the effect of the Marital status on risk. This is, indeed,

an empirical question. For our purposes, we will formulate the following hypothesis, and will carefully interpret the results of our study. – *H4: Married individuals will be more risk averse than single individuals.*

2.5.2. Parenthood

In the same family structure context, the presence of children also has an effect on the risk-taking behavior of an individual, which can be partly also explained by the marital status effect in some cases.

According to Christiansen *et al.* (2015), Xiao (1996), and Love (2010) individuals with children tend to invest less in the stock market, and are less willing to take risks (*e.g.*, Yao *et al.* (2004), Dohmen *et al.* (2011), and West and Worthington (2012)). Besides that, Gerrans *et al.* (2012) reported that changes in the number of children significantly altered the level of an individual's risk tolerance. Love (2010) also considered that the effect of the joint maximization problem in a couple can be amplified or reduced by the presence of children. Moreover, when the family structure changes with the addition of a new member, a reorganization of the roles and rules stipulated by norms are required by the institution of family. With the presence of children, the parents need to follow stage specific norms with the purpose of providing security and nourishment to their children, due to the high stake in survival and socialization of new members (Klein & White (1996)). As stated by Tversky & Kahneman (1979) in this case losses have a higher impact than gains, given that losses may dislocate necessary resources to the children's budget. As a result, parents are more likely to choose certain outcomes rather than uncertain ones, being more risk-averse

than the individuals without dependents. To confirm this fact, Grable & Joo (1999) found a negative relationship between the number of dependents and the financial risk tolerance, although Sung & Hanna (1996) found no relationship between these two variables.

Consequently, the hypothesis to be studied in this dissertation related to this parenthood variable will be – *H5: Individuals with children tend to be less risk taking than individuals without children.*

2.6. Professional experience and education

Regarding the sixth hypothesis, we study the effect of the amount of information and skills that an investor possesses (through Level of Financial Education and professional experience) on his or her risk-taking behavior.

Firstly, there are different notions of financial literacy according to different authors. For instance, Remund (2010) defines financial literacy as a measure of the degree to which an investor understands the key financial concepts and has the abilities and confidence to manage his or her personal finances in the short or long term and through any life events or economic decisions. Huhmann & McQuitty (2009) partly agree with Remund's definition, stating that financial literacy is one of the two components which created financial numeracy (together with financial capacity).

In fact, Yao (2011) argue that those with scarce financial experience and financial literacy are expected to have a divergent perception of financial risks, in which Huhmann & McQuitty (2009) added that these individuals will have more

difficulties to understand financial concepts, decreasing their financial tolerance. Furthermore, an increased amount of information has a positive impact on the investor's confidence, which may not be efficient due to the lack of adjustment in his/her cognitive abilities (Tsai, Klayman & Hastie (2008)). Similarly, financial literacy such as financial education and knowledge, can be advantageous to investors to improve their trading behavior, and to reduce biases in tasks in which such knowledge would be helpful (Agnew & Szykman (2005), Elliot, Hodge, & Jackson (2008)). Furthermore, it is noticed that in recent years it has become popular to explore the association between financial literacy and financial risk tolerance, mainly among students and young participants (Beal & Delpachira (2003), Huzdik (2014), Shahrabani (2013) and Sjöberg & Engelberg (2009)). Authors such as Grable (2000), Gärling (2009), Cooper (2014), Hallahan (2004), Van de Venter (2012) and Yao (2011) found that financial literacy is statistically related to financial risk tolerance. Among these authors, Yao (2011) and Ryack (2011) found that there is lack of attention regarding this subject, advising more future research, while Grable (2000), Grable & Joo (2004), Grable & Lytton (1998), Hallahan (2004), Ryack, (2011), Sages & Grable (2010), Sjöberg & Engelberg (2009), Yao (2011), have found that financial literacy comes with higher education and increases financial risk tolerance.

Additionally, some earlier authors have investigated this association between financial literacy and risk attitude using Swedish data (the authors have conducted the studies independently of one another: Almenberg & Säve-Söderbergh (2011), Almenberg & Widmark (2011), Sjöberg & Engelberg (2009)). Moreover, Cutler (1995), Grable & Joo (1997), and Haliassos & Bertraut (1995)

suggested that individuals who have more knowledge concerning risky situations tend to have a certain psychological profile which allows them to carry a higher level of risk (Sung & Hanna (1996)).

In terms of conclusion, it is relevant to note that some prior researchers have made the distinction between financial literacy obtained from education and financial literacy obtained from professional experience (for instance stock market experience). However, since most of the participants of my dissertation were students it was decided to connect financial literacy with a higher level of education and professional experience. Therefore, the hypothesis studied in this dissertation about financial knowledge will be H6a: *Individuals with a higher level of financial education will be more risk taking*, and regarding professional experience will be H6b: *Individuals with professional experience will be more risk taking.*

2.7. Financial knowledge perception

Even though individuals possess some financial literacy, another important aspect to consider is their self-perception of this knowledge, and its impact on risk taking.

Disney & Gather (2013) studied individuals with poor financial literacy, and have concluded that these individuals are aware of their own lack of financial knowledge, and consequently are less confident, ending up facing less financial risk. Moreover, Huzdik (2014) attempted to measure financial literacy of higher educational students, assuming that it is typical to have realistic perceptions of their knowledge; nonetheless it is more common for higher education students to

overestimate their knowledge instead of underestimate it. In fact, Lichtenstein & Fishhoff (1977) have found that average confidence estimates exceed performance accuracy. In the same context, Torngrena & Montgomery (2004) compare the accuracy and confidence of laymen (individuals who do not have technical knowledge) and finance professionals, and they reach the conclusion that while in the confidence field finance professionals are more confident than laymen, in accuracy terms financial professionals were less accurate than laymen. According to Heath & Tversky (1991), investors believe that they have more control over the next day events, rather than guessing past events. A similar concept related to this subject is the Illusion of knowledge, which can be perceived in the following manner: the more information people have about a subject, the more confidently they will behave in making decisions about it. However, this fact does not mean that the choices people make become more accurate – each additional portion of information boosts our confidence faster than our knowledge, as stated by Oskamp (1965). Consequently, the more confident investors are about their skills, the more risk seeking they will turn out to be, as mentioned previously in this dissertation (Odean (1998)).

Actually, in the questionnaire used in the empirical section of this dissertation, the first question that is asked to respondents was whether they considered to have got enough knowledge to invest in Financial Markets, hence an evaluation to their knowledge self-perception was conducted. Consequently, the hypothesis to test in this dissertation will be – *H7: Individuals with a positive self-perception of their financial knowledge will have higher levels of risk taking.*

2.8. Level of Income

Various studies were conducted with the purpose to find a link between the level of wealth and financial risk tolerance. Most previous studies have found a strong evidence between income and financial risk tolerance, that is a higher risk tolerance in individuals with greater household income (Grable *et al.* (2010), Grable & Joo (2004), Hallahan *et al.* (2004), Ryack (2011)). More specifically, Grable (2000) suggests that professionals have a higher risk tolerance compared to people with low income. Yao *et al.* (2011), explain this relationship by the fact that individuals with higher income can accumulate enough capital to fulfil their desired lifestyle. Grable & Joo (1999) found a positive relationship between income and financial risk tolerance, which was confirmed by Cicchetti & Dubin (1994), Lee & Hanna (1991), Riley & Chow (1992), Schooley & Worden (1996), Show (1996), and Sung & Hanna (1996) who have also identified the same positive association between level of income and risk tolerance.

Moreover, in Tversky & Kahneman (1979)'s Prospect Theory, this positive relationship between risk and wealth is also present. These authors stated that the carriers of value are not solely final states, but changes in the wealth or welfare. For instance, the same level of wealth may suggest richness for one person and poverty for another, depending on their current assets. In this way, the concept of value should represent a function not only of the asset position that attends as reference point, but also of the magnitude of the change from that same reference point.

As a result, the hypothesis to be studied in this dissertation will be – *H8: Individuals with a higher level of income will have a more risk-seeking profile.*

3. Data Description and Methodology

3.1. Data Description

Data was obtained using an online questionnaire sent via e-mail to Instituto Superior de Economia e Gestão (ISEG) students. There were two reinforcements, after 2 and 4 weeks of the initial outbound. The full questionnaire is shown in Annex I.

In order to ensure the full comprehension of the questions and to track errors, the questionnaire was pre-tested by twenty students of ISEG. This pre-test was sent to friends who after doing it gave me their opinion, and it was carried in the same conditions as the real one, via e-mail. In the end, 211 responses were recorded. The respondents were in their majority students, both undergraduates and postgraduates, and we also obtained a small number of answers from students who, in the meantime, completed their degrees.

The decision to collect data through a questionnaire was made essentially because it is easy, low cost, and it ensures the anonymity of the respondents – besides the fact that we are interested in studying this student population. However, conducting questionnaires also carries some limitations, since respondents can ignore them, which leads to a low response rate according by Hoonakker & Carayon, 2009). The lack of responses can also be associated with the extensive length of the Survey. To support this idea, two Asiu, Antons & Fultz (1998) and Handwerk, Carson, & Blackwell (2000) suggest that the ideal length for a questionnaire is thirteen minutes or less. In this dissertation, on average respondents took 17 minutes to complete the questionnaire, slightly above the

ideal length, but necessary in order to apply both risk-scales we are examining. We obtained 211 complete responses.

Annex II defines our variables and presents descriptive statistics of the sample. About 50.2% are male and 49.8% females, respondents have an average age of 25 years old, 47.4% are single, 8.5% are married and 8.5% have children. Regarding the education 43.1% are from a Master degree following a percentage of 37.4% from undergraduate degree, and there is a minority of post-graduation students (8.1%) and PhD students (0.9%). The PhD students considered were from financial areas only. Furthermore, 72.0% of the respondents have professional experience. About 57.8% of the respondents consider not to have sufficient financial knowledge (personal perception). Concerning the parents' education level, 30.8% of the fathers have at least some high school or lower degree (30.8%), whereas 33.2% of the mothers have an undergraduate degree. Finally, the most frequent monthly family level of income ranges from 2000 to 3499 euros, representing 33.2% of the sample.

3.2. Measures and scales

The purpose of this dissertation is to evaluate the impact of socio-demographic variables on an individual's risk attitudes. Therefore, it is necessary to measure the individual's risk attitudes as well as his or her risk tolerance, and connect these results with the main socio-demographic variables.

3.2.1. DOSPERT Scale

The Domain-Specific Risk-Attitude Scale (DOSPERT), created by Weber, Blais & Betz (2006), has two singular features: it establishes the difference

between risk perception and attitude towards risk, and it examines risk-taking and its determinants in several distinct content domains. Essentially, the scale measures the individual differences in attitudes towards risk, thus the differences in the way people solve situations involving risk. However, in this dissertation only the level of risk-taking (hence the attitudes toward risk) will be assessed, not taking in account the risk perceptions.

The scale has 30 questions including five domains of life – ethical, financial, health/safety, social, and recreational risks – and studies the likelihood with which the respondents might engage in risky activities or behaviors, using a 7-point rating scale ranging from 1 (Extremely unlikely) to 7 (Extremely Likely). Example items of the different domains in the scale include "Having an affair with a married man/woman" (Ethical), "Investing 10% of your annual income in a new business venture" (Financial), "Engaging in unprotected sex" (Health/Safety), "Disagreeing with an authority figure on a major issue" (Social), and "Taking a weekend sky-diving class" (Recreational). In the end, all the items of all subscales are added, with higher scores indicating a greater risk-taking in the domain of the subscale. However, in this dissertation it will be only the final score which takes in account all subscales values, given that the goal is to evaluate the Risk profile in general. The Cronbach alpha was 0.77, revealing an acceptable measure of reliability (DeVellis, 1971).

3.2.2. Grable and Lytton Risk Tolerance Scale (GL-RTS)

The Grable and Lytton Risk Tolerance *Scale* was proposed in 1999 by Grable and Lytton, and its main objective is to an evaluate individual's risk tolerance. The scale has 13 questions in three main constructs: investment risk,

risk comfort and experience, and speculative risk, offering a strong degree of multidimensionality in the measurement of financial risk tolerance. The questions are multiples choice and the score of the scale ranges from 13 to 47, with higher scores corresponding to higher levels of Financial Risk Tolerance. The Cronbach alpha obtained was 0.50 approximately, revealing an unacceptable measure of reliability (DeVellis, 1991). It is important to mention that with a Cronbach alpha of 0.5 the results achieved are not going to be so reliable, however given the interesting content and relevance of the scale I have decided to carry one.

3.3. Variables

Annex II describes the variables used in this dissertation. With the purpose to study the relationship between risk attitudes and socio-demographic variables, a linear regression analysis was performed for two models using the variables shown in Annex II and the *STATA* statistical program. The models are presented as models (1) and (2). Model (1) represents the relationship between the DOSPERT scale measure of risk and the socio-demographic variables, while Model (2) characterizes the relationship between the GL-RTS scale measure of risk and the socio-demographic variables. Socio-demographic variables being: Gender, Age, Marital Status, Parenthood, Father Education, Mother Education, Education Level, Professional Experience, Financial Knowledge Perception and Monthly Level of Income. α represents the constant, β the coefficients to estimate and ε is the error term.

$(1)\ DospertTotalRiskScore$

$$= \alpha\ +\ \beta1Gender\ +\ \beta2Age\ +\ \beta3MaritalStatus$$

$$+\ \beta4Parenthood\ +\ \beta5FatherEducation\ +\ \beta6MotherEducation$$

$$+\ \beta7EducationLevel\ +\ \beta8ProfessionalExperience$$

$$+\ \beta9FinancialKnowledgePerception$$

$$+\ \beta10MonthlyLevelofIncome\ +\ \varepsilon$$

$(2)\ GL-RTS\ Total\ Risk\ score\ =\ \alpha\ +\ \beta1Gender\ +\ \beta2Age\ +$
$\beta3Marital\ status\ +\ \beta4Parenthood\ +\ \beta5FatherEducation\ +$
$\beta6\ MotherEducation\ +\ \beta7EducationLevel\ +\ \beta8ProfessionalExperience\ +$
$\beta9FinancialKnowledgePerception\ +\ \beta10MonthlyLevelofIncome\ +\ \varepsilon$

4. Results

4.1. Descriptive statistics

Annex III and IV show in detail the descriptive statistics of the risk related variables. For the DOSPERT scale (in detail in Annex III), the lowest risk score was observed in question 10 - *Passing off somebody else's work as your own -* whereas the highest score was seen in question *1 - Admitting that your tastes are different from those of a friend -.* Overall, the mean of the DOSPERT Risk score was 102.73. which reveals that respondents are more risk averse considering lower scores as lower levels of Financial Risk Tolerance. Regarding, the GL-RTS Risk scale (in detail in Annex IV), the mean is 24.49 showing once more a predominance for respondents with a more risk-averse profile. More precisely, question *1 - In general, how would your best friend describe you as a risk taker -* has the largest mean showing a higher risk tolerance, whereas question *9 - Given*

the best and worst case returns of the four investment choices … - has the lowest

mean showing more tendency to avoid risk. Annex IV shows the descriptive

statistics of GL-RTS scale questions.

Table I shows the recoded variables used in the T-tests.

Table I - Recoded variables

Age	1 if up to 18 to 23 years old; 0 if 24 years old or more. Allocated by the Median which is 23 years old.
Level of Financial Education	1 if Master's degree or more; 0 to Undergraduate degree
Father's and Mother's education level	1 if has high school diploma or less; 0 if has a University degree
Monthly Level of income	1 if income less than 1999€; 2 if income 2000€ or more.
Marital status	1 if married; 0 if not married

4.2. T–Tests of Difference in Means

An independent samples t-test was conducted in order to compare the

means of groups of variables to determine if there were significant differences in

the level of Risk. The null hypothesis is the equality of means between the groups

of variables. Table II shows the mean and t-value for the different variables.

Table II – T-tests

	DOSPERT Scale			GL-RTS Scale		
	Mean		T-value	Mean		T-value
Gender	**Male**	**Female**		**Male**	**Female**	
	106.97	98.36	3.357***	24.81	24.17	1.340
Age	**18 - 23**	**24 or more**		**18-23**	**24 or more**	
	103.61	101.67	0.773	23.98	25.09	-2.362**

	Not married	Married		Not married	Married	
Marital status	103.31	96.13	- 1.489	24.48	24.65	0.197
Parenthood	Yes	No		Yes	No	
	100.63	102.91	- 0.472	26.18	24.34	2.139**
Father's education	High school diploma or less	University degree		High school diploma or less	University degree	
	104.08	100.92	1.190	24.92	23.92	1.092**
Mother's education	High school diploma or less	University degree		High school diploma or less	University degree	
	104.02	101.0	1.136	24.71	24.19	1.092
Level of Financial Education	Undergraduate degree	Master's degree or more		Undergraduate degree	Master's degree or more	
	101.81	103.76	0.716	23.67	24.93	2.475***
Professional experience	Yes	No		Yes	No	
	101.83	104.91	-1.144	24.55	24.34	0.381
Financial knowledge perception	High	Low		High	Low	
	106.77	99.83	2.638***	25.45	23.78	3.596***
Monthly Level of income	Until 1999 €	2000 € or More		Until 1999 €	2000 € or More	
	100.70	104.15	- 1.296	24.22	24.68	- 0.954

Note: *, ** and *** indicate significance levels of 10%, 5% and 1%, respectively.

The tested hypothesis were stated in the previous section of literature review (section 2.) In terms of differences in means the variables that are significant are gender (H1) in the DOSPERT scale, Age (H2) in the GL-RTS Scale, Parenthood (H5) in the GL-RTS Scale, Father's Education (H3) in the GL-RTS scale, Level of Financial Education (H6a) in the GL-RTS Scale, and Financial Knowledge Self-perception (H7) in the GL-RTS Scale.

In terms of the DOSPERT risk scale, it can be verified that the mean risk score for the male and female individuals as well as the mean risk score for the individuals who have a positive and a less positive financial knowledge perception are significantly different at a significance level of 1%, revealing that women and individuals with a less positive financial perception are less willing to take risk in financial decisions. The remaining variables are not statistically significant for the risk score.

Regarding the GL-RTS risk scale, given the low Cronbach alpha, we choose not to further analyze these results.

4.3. Linear Regression Models

Table III shows the Linear Regressions estimates of the models presented in section (3.2.2.).

Table III – Linear Regressions Models Estimates

VARIABLES	(1) Dosp_total	(2) GL-RTS
Gender	8.7507***	0.0257
	(2.9614)	(0.0501)
Age	0.1872	0.0987
	(0.6359)	(1.6239)
Marital status		
In a relationship	-3.1053	-1.4245***
	(-0.9730)	(-2.7433)
Living with significant other	-1.4161	-1.6165
	(-0.2548)	(-1.4611)
Married	-8.2403	-3.3908***
	(-1.4169)	(-3.0647)
Parenthood	0.3891	0.6733
	(0.0590)	(0.4725)
Father education		
High School degree	-5.0715	-0.9191
	(-1.4392)	(-1.1281)
Bachelor degree	-6.4247	-1.7111*
	(-1.6084)	(-1.7359)

Master degree	-4.2693	0.2764
	(-0.8127)	(0.2607)
Mother education		
High School degree	7.7674*	0.1543
	(1.9077)	(0.1714)
Bachelor degree	3.1529	0.4060
	(0.6309)	(0.4032)
Master degree	7.6884	-0.6109
	(1.2326)	(-0.5180)
Education level		
Master degree	3.4051	0.9348*
	(1.0894)	(1.7876)
Post graduation	-4.4538	1.3997
	(-0.8341)	(1.2538)
PhD	7.8433*	2.6855***
	(1.7768)	(3.2892)
Professional experience	-4.5275	-0.4274
	(-1.4436)	(-0.6951)
Financial knowledge perception	3.6954	0.5861
	(1.1168)	(0.9450)
Level of monthly income		
Between €600 and €1199	2.3281	0.0247
	(0.3493)	(0.0129)
Between €1200 and €1999	-2.7415	-0.3090
	(-0.4153)	(-0.1654)
Between €2000 and €3499	0.3292	1.1358
	(0.0482)	(0.6214)
Between €3500 and €4999	6.0290	0.2031
	(0.8043)	(0.1065)
More than €5000	2.3484	-0.5383
	(0.2946)	(-0.2824)
Constant	94.5159***	22.4873***
	(10.3226)	(8.8462)
Observations	177	186
R-squared	0.1518	0.2048

Columns 1 and 2 show the results for DOSPERT total risk score and for GL-RTS total risk score respectively. Robust t-statistics in parenthesis. *, ** and *** indicate significance levels of 10%, 5% and 1% respectively.

According to Table III, in model 1 (DOSPERT Scale) the variable Gender (H1) is statistically significant at the 1% significance level. This confirms Hypothesis 1 in our sample, that men are more risk-taking than women. The only other statistically significant variables in this model (at a 10% significance level)

are the Mother's education (in particular having a high school degree) and the Individual's level of education, specifically in a PhD program. Therefore, there is weak evidence in favor of Hypotheses H3 and H6a. The remaining variables are not significant in this model. The overall results present stronger evidence in favor of a gender effect in risk-taking behavior.

In what concerns model 2 one should be very careful in the interpretation of the outputs given the low validity indicators of the model (Cronbach alpha of 0.5). In any case, we can highlight as significant the variables Marital Status, Father's Education, and Educational Level of the Individual.

Regarding our strongest variable, gender, previous literature have attained similar conclusions to the ones reached in this dissertation. In model (1) the variable gender is positively related to the risk score, confirming the previous literature about men being more willing to take risk than women (Atkison (1983), Byrnes (1998)).

5. Conclusions

5.1. Final conclusions

The Risk Profile of each investor depends upon several factors, ranging from aspects concerning own personality to aspects regarding life background and history. Following the literature review and using two specifications of a linear regression model, we study the possible relation between an Individual's Risk attitudes and 10 socio-demographic variables were studied (Gender, Age, Marital status, Parenthood, Father and Mother education, Education level, Professional experience, Financial knowledge perception, and Monthly Level of income.) Risk

was measured using two different well-established scales, a 30-questions scale, including 5 life domains, denominated DOSPERT, created by Weber, Blais and Betz (2002), and a multiple-choice scale known as GL-RTS created by Grable and Lytton in 1999. Data for both scales was collected through a questionnaire held online and prepared with software Qualtrics; the link was sent via e-mail and social media to ISEG students by myself and my dissertation advisers.

The main results found in this dissertation were that gender was the variable that revealed to have a more significant influence on an individual's risk attitude in the context of a student population in a business school.

5.2. Limitations and Future Research

Possible limitations of this dissertation relate to the method of data collection, given the large size and complexity of the scales used. For this reason, the response rate could have been higher and if we had reduced the extension of the questionnaire. However, we did obtain interesting results from a reasonable sample size of of 211 individuals. This could be an interesting starting points for future research: to create a shorter and less complex scale with the purpose not only to save time for respondents and also to allow them to answer more carefully. I have chosen these scales for the fact that these ones are able to provide solid and comparable results, and do evaluate the individual's risk attitudes in several sub-areas of finance and even in personal terms, which has become very interesting in this dissertation.

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7. Annex

Annex I. Risk Investor Questionnaire

This questionnaire is aimed at studying the risk tolerance and risk attitude of business school students. The answers provided will be used for academic purposes only, and will be treated anonymously and with confidentiality. Please read carefully each question and answer truthfully: there are no right or wrong answers – they simply reflect your preferences. It is important that you answer all questions. Thank you for your collaboration, as it is essential for the completion of this study.

PART 1: IN THIS FIRST PART OF THE QUESTIONNAIRE YOU WILL CLASSIFY YOUR OWN BEHAVIOR IN TERMS OF RISK TAKING (FROM EXTREMELY UNLIKELY TO EXTREMELY LIKELY). Please BE HONEST, AS THERE ARE NO RIGHT OR WRONG ANSWERS.

Do you consider you have enough knowledge to invest in Financial Markets?

❍ Yes
❍ No

1.   Admitting that your tastes are different from those of a friend.

2.   Going camping in the wilderness.

3.   Betting a day's income at the horse races.

4.   Investing 10% of your annual income in a moderate growth diversified fund.

5.   Drinking heavily at a social function.

6.   Taking some questionable deductions on your income tax return.

7.   Disagreeing with an authority figure on a major issue.

8.   Betting a day's income at a high-stake poker game.

9.   Having an affair with a married man/woman.

10.   Passing off somebody else's work as your own.

11.   Going down a ski run that is beyond your ability.

12.   Investing 5% of your annual income in a very speculative stock.

13.   Going whitewater rafting at high water in the spring.

14.   Betting a day's income on the outcome of a sporting event

15.   Engaging in unprotected sex.

16.   Revealing a friend's secret to someone else.

17.   Driving a car without wearing a seat belt.

18.   Investing 10% of your annual income in a new business venture.

19.   Taking a skydiving class.

20.   Riding a motorcycle without a helmet.

21.   Choosing a career that you truly enjoy over a more secure one.

22.   Speaking your mind about an unpopular issue in a meeting at work.

23.   Sunbathing without sunscreen.

24.   Bungee jumping off a tall bridge.

25.   Piloting a small plane.

26.   Walking home alone at night in an unsafe area of town.

27.   Moving to a city far away from your extended family.

28.   Starting a new career in your mid-thirties.

29.   Leaving your young children alone at home while running an errand.

30.   Not returning a wallet you found that contains $200.

PART 2: IN THE SECOND PART OF THIS QUESTIONNAIRE YOU WILL ANSWER 13 QUESTIONS ABOUT INVESTMENT DECISIONS. AGAIN, THERE ARE NO RIGHT OR WRONG ANSWERS - PLEASE ANSWER TRUTHFULLY.

1. In general, how would your best friend describe you as a risk taker?

- ❍ A real gamber
- ❍ Willing to take risks after completing adequate research
- ❍ Cautious
- ❍ A real risk avoider

2. You are on a TV game show and can choose one of the following. Which would you take?

- ❍ €1000 in cash
- ❍ A 50% chance at winning €5000
- ❍ A 25% chance at winning €10 000
- ❍ A 5% chance at winning €100 000

3. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:

- ❍ Cancel the vacation
- ❍ Take a much more modest vacation
- ❍ Go as scheduled, reasoning that you need the time to prepare for a job search
- ❍ Extend your vacation, because this might be your last chance to go first-class

4. If you unexpectedly received €20 000 to invest, what would you do?

- ❍ Deposit it in a bank account, money market account, or an insured CD
- ❍ Invest it in safe high-quality bonds or bond mutual funds
- ❍ Invest it in stocks or stock mutual funds

5. In terms of experience, how comfortable are you investing in stocks or stock mutual funds?

- ❍ Not at all confortable
- ❍ Somewhat confortable
- ❍ Very confortable

6. When you think of the word "risk", which of the following words comes to mind first?

- ❍ Loss
- ❍ Uncertainty
- ❍ Opportunity
- ❍ Thrill

7. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value. Bond prices may fall; however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

- ❍ Hold the bonds
- ❍ Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets
- ❍ Sell the bonds and put the total proceeds into hard assets
- ❍ Sell the bonds, put all the money into hard assets, and borrow additional money to buy more

8. Given the best and worst case returns of the four investment choices below, which would you prefer?

❍ €200 gain best case; €0 gain/loss worst case
❍ €800 gain best case; €200 loss worst case
❍ €2600 gain best case; €800 loss worst case
❍ €4800 gain best case; €2400 loss worst case

9. In addition to whatever you own, you have been given €1000. You are now asked to choose between:

❍ A sure gain of €500
❍ A 50% chance to gain €1000 and a 50% chance to gain nothing

10. In addition to whatever you own, you have been given €2000. You are now asked to choose between:

❍ A sure loss of €500
❍ A 50% chance to lose €1000 and a 50% chance to lose nothing

11. Suppose a relative left you an inheritance of €100 000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?

❍ A savings account or money market mutual fund
❍ A mutual fund that owns stocks and bonds
❍ A portfolio of 15 common stocks
❍ Commodities like gold, silver, and oil

12. If you had to invest €20 000, which of the following investment choices would you find most appealing?

❍ 60% in low-risk investments, 30% in medium-risk investments, 10% in high-risk investments
❍ 30% in low-risk investments, 40% in medium-risk investments, 30% in high-risk investments
❍ 10% in low-risk investments, 40% in medium-risk investments, 50% in high-risk investments

13. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?

❍ Nothing
❍ One month's salary
❍ Three month's salary
❍ Six month's salary

PART 3: IN THIS FINAL SECTION OF THE QUESTIONNAIRE PLEASE PROVIDE VERY SIMPLE INFORMATION ABOUT YOUR BACKGROUND IN TERMS OF SOCIO-DEMOGRAPHIC DATA.

Gender

❍ Male
❍ Female

Age (in years) _____

Relationship status

❍ Single
❍ In a relationship
❍ Living with significant other
❍ Married
❍ Divorced
❍ Widowed

Nationality (select the Country) – (List with all 197 countries in the world)

Have you ever lived in another country?

❍ Yes
❍ No

Where? Select the country/(ies). Please note: To select more than one country please keep pressuring CTRL while you do the selection. - (List with all 197 countries in the world)

How long have you lived abroad?

❍ Less than 6 months
❍ Between 6 months and 1 year
❍ More than 1 year

Which program are you currently a student of:

❍ Bachelor
❍ Master
❍ Postgraduation
❍ PhD

Which Bachelor?

❍ Economics (in English)
❍ Management (in English)
❍ Economia
❍ Finanças
❍ Gestão
❍ Gestão do Desporto
❍ Matemática Aplicada à Economia e à Gestão
❍ Other _____

Which Master?

❍ Actuarial Science
❍ Economics
❍ Finance
❍ Mathematical Finance
❍ Monetary and Financial Economics
❍ Contabilidade, Fiscalidade e Finanças Empresariais
❍ Other _____

Which Postgraduation?

❍ Análise Financeira
❍ Gestão de Bancos e Seguradoras
❍ Gestão de Operações Bancárias
❍ Other _____

Which PhD?

❍ Economia
❍ Gestão
❍ Matemática Aplicada

Have you previously completed university studies?

❍ Yes
❍ No

Which degree(s) have you completed, and in what field?

Completed:

❑ Bachelor
❑ Master
❑ Postgraduation
❑ PhD

Bachelor's field:

- ❍ Economics
- ❍ Management
- ❍ Accounting
- ❍ Finance
- ❍ Engineering
- ❍ Law
- ❍ Mathematics
- ❍ Other _____

Master's field:

- ❍ Economics
- ❍ Management
- ❍ Accounting
- ❍ Finance
- ❍ Engineering
- ❍ Law
- ❍ Mathematics
- ❍ Other _____

Postgraduation' field:

- ❍ Economics
- ❍ Management
- ❍ Accounting
- ❍ Finance
- ❍ Engineering
- ❍ Law
- ❍ Mathematics
- ❍ Other _____

PhD' field:

- ❍ Economics
- ❍ Management
- ❍ Accounting
- ❍ Finance
- ❍ Engineering
- ❍ Law
- ❍ Mathematics
- ❍ Other _____

Do you have any work experience?

- ❍ Yes
- ❍ No

For how long?

- ❍ Less than 3 months
- ❍ Between 3 months and 6 months
- ❍ Between 6 months and 1 year
- ❍ Between 1 and 5 years
- ❍ More than 5 years

Are you currently employed?

- ❍ Yes
- ❍ No

Regarding your family background, what is your parents' level of education?

Father:

- ❍ Some High School or less
- ❍ High school diploma
- ❍ Bachelor's degree
- ❍ Master's degree

Mother:

- ❍ Some High School or less
- ❍ High school diploma
- ❍ Bachelor's degree
- ❍ Master's degree

Have you got any children?

- ❍ Yes
- ❍ No

Who do you live with?

- ❍ With both your parents
- ❍ With one of your parents
- ❍ Alone
- ❍ With a partner
- ❍ With friends
- ❍ With your own children

How many people live with you in the same house?

- ❍ 0
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ ≥ 4

What is your family's average monthly income (after tax)?

- ❍ Less than €600
- ❍ Between €600 and €1199
- ❍ Between €1200 to €1999
- ❍ Between €2000 and €3499
- ❍ Between €3500 and €5000
- ❍ More than €5000

Annex II – Variables Definition and Descriptive Statistics of the Sample

Variables		Frequency	Percentage	Description	Descriptive statistics			
					Min	Max	Mean	SD
Gender	Male	106	50.2%	1 if male; 0 if female	0	1	0.5	0.5
	Female	105	49.8%					
	Total	211	100.0%					
Age	18 to 23 years old	114	54.0%	Age of the respondents, Continuous value	18	59	25.2	6.5
	24 years old or more	97	46,0%					
	Total	211	100.0%					
Marital status	Single	100	47.4%	1 – Single; 2 – In a relationship; 3 – Living with significant other; 4 – Married; 5 – Other	0	1	0.1	0.3
	In a relationship	73	34.6%					
	Living with significant other	20	9.5%					
	Married	18	8.5%					
	Total	211	100.0%					
Level of Financial Education	Undergraduate degree	79	37.4%	1 – Undergraduate degree; 2 – Master's degree; 3 – Post graduation; 4 – PhD	1	4	1.7	0.7
	Master	91	43.1%					
	Post Graduation	17	8.1%					
	PhD	2	0.9%					
	Not currently studying	22	10.4%					
	Total	211	100.0%					

Father' education level	Some High School or less	65	30.8%	1 – some high school or less; 2 – Highschool diploma; 3 – Undergra-duate degree; 4 – Master's degree	1	4	2.3	1.1
	High school diploma	55	26.1%				
	Undergraduate degree	54	25.6%				
	Master's degree	37	17.5%				
	Total	211	100.00%				
Mother' education level	Some High School or less	55	25.6%	1 – some high school or less; 2 – Highschool diploma; 3 – Undergra-duate degree; 4 – Master's degree	1	4	2.3	1.0
	High school diploma	66	31.3%				
	Undergraduate degree	70	33.2%				
	Master's degree	21	10.0%				
	Total	211	100.00%				
Financial knowledge perception	No	122	57.8%	1 – Yes; 0 – No	0	1	0.4	0.5
	Yes	89	42.2%				
	Total	211	100.0%				
Monthly income level	Less than €600	9	4.3%	1 – Less than 600€;	1	6	3.7	1.3
	Between €600 and €1199	28	13.3%				

	Between €1200 to €1999	49	23.2%	2 – Between 600€ and 1199€;				
	Between €2000 and €3499	70	33.2%	3 – Between 1200€ and 1999€;				
	Between €3500 and €5000	32	15.2%	4 – Between 2000€ and 3499€;				
	More than €5000	23	10.9%	5 – Between 3500€ and 5000€;				
	Total	211	100.0%	6 – More than 5000€				
Parenthood	With children	18	8.5%					
	With no children	193	91.5%	1 – Yes; 0 – No	0	1	0.1	0.3
	Total	211	100.0%					
Professional experience	Yes	152	72.0%					
	No	59	28.0%	1 – Yes; 0 – No	0	1	0.7	0.4
	Total	211	100.0%					

Annex III - Descriptive statistics of DOSPERT Scale Risk Score

	Min	Max	Mean	Standard deviation
1. Admitting that your tastes are different from those of a friend.	1	7	5.71	1.35
2. Going camping in the wilderness.	1	7	4.21	1.96
3. Betting a day's income at the horse races.	1	7	2.41	1.72
4. Investing 10% of your annual income in a moderate growth diversified fund.	1	7	4.71	1.50
5. Drinking heavily at a social function.	1	7	3.08	1.79
6. Taking some questionable deductions on your income tax return.	1	7	3.01	1.64
7. Disagreeing with an authority figure on a major issue.	1	7	4.06	1.57
8. Betting a day's income at a high-stake poker game.	1	7	2.52	1.87
9. Having an affair with a married man/woman.	1	7	2.19	1.58
10. Passing off somebody else's work as your own.	1	6	1.75	1.15
11. Going down a ski run that is beyond your ability.	1	7	2.89	1.71
12. Investing 5% of your annual income in a very speculative stock.	1	7	3.33	1.74
13. Going whitewater rafting at high water in the spring.	1	7	3.62	1.72
14. Betting a day's income on the outcome of a sporting event	1	7	3.02	1.84

15. Engaging in unprotected sex.	1	7	2.62	1.86
16. Revealing a friend's secret to someone else.	1	6	2.12	1.29
17. Driving a car without wearing a seat belt.	1	7	2.54	1.84
18. Investing 10% of your annual income in a new business venture.	1	7	3.87	1.70
19. Taking a skydiving class.	1	7	4.43	2.02
20. Riding a motorcycle without a helmet.	1	7	2.25	1.70
21. Choosing a career that you truly enjoy over a more secure one.	1	7	4.90	1.50
22. Speaking your mind about an unpopular issue in a meeting at work.	1	7	4.27	1.42
23. Sunbathing without sunscreen.	1	7	4.09	2.01
24. Bungee jumping off a tall bridge.	1	7	3.31	2.08
25. Piloting a small plane.	1	7	3.49	2.04
26. Walking home alone at night in an unsafe area of town.	1	7	3.51	1.79
27. Moving to a city far away from your extended family.	1	7	5.11	1.64
28. Starting a new career in your mid-thirties.	1	7	4.78	1.32
29. Leaving your young children alone at home while running an errand.	1	6	2.22	1.36
30. Not returning a wallet you found that contains $200.	1	7	2.36	1.56

Annex IV - Descriptive statistics GL-RTS scale

Questions	Min	Max	Mean	SD
1. In general, how would your best friend describe you as a risk taker? A real gamber / Willing to take risks after completing adequate research / Cautious / A real risk avoider	1	4	2,52	0,699
2. You are on a TV game show and can choose one of the following. Which would you take? €1000 in cash / A 50% chance at winning €5000 / A 25% chance at winning €10 000 / A 5% chance at winning €100 000	1	4	1,93	0,799
3. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would: Cancel the vacation / Take a much more modest vacation / Go as scheduled, reasoning that you need the time to prepare for a job search / Extend your vacation, because this might be your last chance to go first-class	1	4	2,15	0,876
4. If you unexpectedly received €20 000 to invest, what would you do? Deposit it in a bank account, money market account, or an insured CD / Invest it in safe high-quality bonds or bond mutual funds / Invest it in stocks or stock mutual funds	1	3	1,88	0,693
5. In terms of experience, how comfortable are you investing in stocks or stock mutual funds? Not at all confortable / Somewhat confortable / Very confortable	1	3	1,51	0,628
6. When you think of the word "risk", which of the following words comes to mind first? Loss / Uncertainty / Opportunity / Thrill	1	4	2,11	0,531
7. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value. Bond prices may fall; however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do? Hold the bonds / Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets / Sell the bonds and put the total proceeds into hard assets / Sell the bonds, put all the money into hard assets, and borrow additional money to buy more	1	4	1,75	0,641

8. Given the best and worst case returns of the four investment choices below, which would you prefer? €200 gain best case; €0 gain/loss worst case / €800 gain best case; €200 loss worst case / €2600 gain best case; €800 loss worst case / €4800 gain best case; €2400 loss worst case	1	4	2,13	0,782
9. In addition to whatever you own, you have been given €1000. You are now asked to choose between: A sure gain of €500 / A 50% chance to gain €1000 and a 50% chance to gain nothing	1	2	1,39	0,489
10. In addition to whatever you own, you have been given €2000. You are now asked to choose between: A sure loss of €500 / A 50% chance to lose €1000 and a 50% chance to lose nothing	1	2	1,67	0,472
11. Suppose a relative left you an inheritance of €100 000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select? A savings account or money market mutual fund / A mutual fund that owns stocks and bonds / A portfolio of 15 common stocks / Commodities like gold, silver, and oil	1	4	2,01	0,983
12. If you had to invest €20 000, which of the following investment choices would you find most appealing? 60% in low-risk investments, 30% in medium-risk investments, 10% in high-risk investments / 30% in low-risk investments, 40% in medium-risk investments, 30% in high-risk investments / 10% in low-risk investments, 40% in medium-risk investments, 50% in high-risk investments	1	3	1,49	0,564
13. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest? Nothing / One month's salary / Three month's salary / Six month's salary	1	4	1,93	0,707
Total GL-RTS	**13**	**47**	**24,49**	**3,42**